



# Definiteness projection

Matthew Mandelkern<sup>1</sup> · Daniel Rothschild<sup>2</sup> 

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## Abstract

We argue that definite noun phrases give rise to uniqueness inferences characterized by a pattern we call *definiteness projection*. Definiteness projection says that the uniqueness inference of a definite projects out unless there is an indefinite antecedent in a position that filters presuppositions. We argue that definiteness projection poses a serious puzzle for e-type theories of (in)definites; on such theories, indefinites should filter existence presuppositions but not uniqueness presuppositions. We argue that definiteness projection also poses challenges for dynamic approaches, which have trouble generating uniqueness inferences and predicting some filtering behavior, though unlike the challenge for e-type theories, these challenges have mostly been noted in the literature, albeit in a piecemeal way. Our central aim, however, is not to argue for or against a particular view, but rather to formulate and motivate a generalization about definiteness which any adequate theory must account for.

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Matthew Mandelkern and Daniel Rothschild have contributed equally.

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✉ Daniel Rothschild  
[d.rothschild@ucl.ac.uk](mailto:d.rothschild@ucl.ac.uk)

Matthew Mandelkern  
[matthew.mandelkern@all-souls.ox.ac.uk](mailto:matthew.mandelkern@all-souls.ox.ac.uk)

<sup>1</sup> All Souls College, Oxford OX1 4AL, UK

<sup>2</sup> University College London, Gower Street, London WC1E 6BT, UK

# 1 Introduction: two approaches to donkey anaphora

Sentences like (1) and (2) contain anaphoric relations that are surprisingly hard to make sense of:

- (1) Every man who owns a donkey pays taxes on it.
- (2) Always, if a man owns a donkey, he pays taxes on it.

This *donkey anaphora* is the subject of a long and complex literature, and of this paper. There are two major schools of thought about how to account for donkey anaphora: *dynamic* approaches<sup>1</sup> and *e-type* theories.<sup>2</sup> Both approaches give a unified account of definite descriptions ('the donkey', etc.) and pronouns ('it', 'he', etc.)—but in different ways.<sup>3</sup>

Dynamic theories hold that definites in general (that is, definite descriptions and pronouns) are essentially variables, which must be connected to a discourse referent that has been introduced by an appropriately placed indefinite (like 'a donkey'). On this view, sentences such as (1) and (2) include co-indexed variables which are "bound" without c-command (i.e. without the kind of syntactic dominance which permits binding in classical theories). To achieve this, the dynamic approach comes with a structured view of contexts, on which they contain information about variables in addition to propositional information. Both kinds of information can get updated intrasententially (via non-classical treatments of conjunction, disjunction, and negation) and intersententially, as conversation proceeds.

E-type theories argue, instead, that definites have Fregean semantics: on these theories, definites presuppose there is a uniquely salient witness to their first argument. And e-type theories hold that indefinites are just existential quantifiers. E-type theories further argue that definites' uniqueness presuppositions are sometimes invisible because we evaluate them relative to very small points of evaluation (*minimal situations*). E-type theories, unlike dynamic theories, do not come with a structured approach to contexts, and do not come with non-classical treatments of conjunction, disjunction, and negation (at least, the extant e-type literature does not argue for either of these,

<sup>1</sup> See Karttunen (1976), Kamp (1981), Heim (1982) for the beginnings of this tradition, and Beaver (2001), Nouwen (2003) for some significant recent developments and overviews. Dekker (1994) and Rothschild (2017) provide close alternatives that hew more closely to standard semantic assumptions.

<sup>2</sup> Geach (1962), Evans (1977), Parsons (1978), Cooper (1979), Neale (1990), Heim (1990a), Ludlow (1994), Büring (2004), Elbourne (2005).

<sup>3</sup> For this reason it would be misleading to characterize the e-type approach simply as the view that donkey pronouns have the semantics of definite descriptions, because that commitment is common to (many versions of) both views. Terminology in this area is notoriously confusing. 'E-type' is sometimes used as a name for the phenomenon which we are calling 'donkey anaphora', rather than as a name for a particular class of theories, which is how we are using it; and it is sometimes used for any theory of that phenomenon. Also, it is never particularly clear in the literature what 'dynamic semantics' means (see Rothschild and Yalcin 2015, 2016 for a different, narrower usage). We are, somewhat stipulatively but in line with much of the literature, using 'e-type' and 'dynamic' in the way laid out presently. Our division of theories into e-type and dynamic is (unavoidably) not exhaustive; e.g. Egli and von Stechow's (1995) choice-function approach is static but without uniqueness presuppositions, so does not fit nicely into either category here. We should emphasize, then, that one central aim of the paper is specifying a pattern that *any* theory of anaphora must satisfy—however it is categorized—and that to our knowledge no extant theory *does* satisfy.

and so implicitly presents itself as conservative in these respects; in the end we will argue that an adequate e-type theory would in fact require both).

A central difference between these theories is that e-type theories ascribe uniqueness presuppositions to definites, while dynamic theories do not. This difference, however, can be hard to detect, because e-type theories' use of minimal situations can make these uniqueness presuppositions essentially invisible in some contexts. The empirical focus of our paper is an examination of whether, and when, definites do in fact give rise to uniqueness implications. We make two observations. The first, widely accepted in the literature, is that definite descriptions do in general give rise to uniqueness (and existence) inferences. The second is that these uniqueness (and existence) implications are 'filtered' by preceding indefinites in the same way that presuppositions can be filtered by preceding linguistic material (in the terminology of Karttunen 1973). We call this latter phenomenon *definiteness filtering*; we call the overall empirical picture—the combination of uniqueness inferences and their filtering—*definiteness projection*.

The bulk of our paper consists in marshaling evidence for our generalization, definiteness projection, and arguing that e-type theories have serious difficulty accounting for it. In the final part of the paper we turn to dynamic theories, where we make two observations. First, dynamic theories predict some *but not all* instances of definiteness filtering. Second, dynamic theories need to be supplemented in order to explain the uniqueness effects that we do observe with definite descriptions.

The reason that we focus mainly on e-type theories here is that the shortcomings of e-type accounts that we discuss have not been fully explored in the literature, whereas the shortcomings of dynamic theories that we point to have already been discussed in various different contexts. The purpose of our paper, however, is not to adjudicate between these two sets of theories but to spell out and motivate an empirical generalization, definiteness projection, and make clearer the problems that both e-type and dynamic theories—but especially e-type theories—face in accounting for this generalization. We hope our arguments will clarify a central desideratum for any theory of the relationship between definites and indefinites.

## 2 E-type theories

In this section we will spell out the key features of e-type theories, which will serve as our main foil throughout the paper, in more detail. The e-type strategy can be characterized by the following key assumptions:

- i) Definite descriptions have Fregean/Russellian semantics, according to which 'The *F* is *G*' is true if and only if there is exactly one (contextually salient) *F* and all *F*s are *G*s; indefinites have the semantics of existential quantifiers in classical first order logic.
- ii) Donkey pronouns, such as 'it' in (1) and (2), are, semantically speaking, definite descriptions whose descriptive content is recovered in some way (pragmatically, syntactically, or both) from context.<sup>4</sup>

<sup>4</sup> There are some variations on this view on which pronouns are a special kind of definite description, as in Evans (1977).

Modern e-type views in general, and those which are our target here in particular, incorporate two further, well-motivated assumptions: first, that the uniqueness and existence implications of definite descriptions are semantic presuppositions;<sup>5</sup> second, that those presuppositions are evaluated not relative to *whole worlds*, but rather relative to parts of worlds, or *minimal situations*. In the rest of this section, we will discuss the motivation and implementation of these two assumptions in more detail.

## 2.1 Presuppositions

The first assumption, again, is that the existence and uniqueness implications of definites are presuppositions, rather than simple entailments. The widely accepted test for whether a bit of content is a presupposition is whether it *projects* through certain environments—negation, left disjuncts, antecedents of conditionals, modals, etc.—and similarly *fails to project* (is *filtered*) in appropriate environments (see Karttunen 1973, 1974; Stalnaker 1974; Heim 1983b for classic discussions). So the question for our purposes is whether sentences like those in (3) communicate that there is a uniquely salient professor of linguistics in Cologne; and whether the sentences in (4), where uniqueness and existence are entailed in the relevant local environment, fail to communicate this:

- (3)
  - a. The professor of linguistics from Cologne didn't come to the conference.
  - b. Either the professor of linguistics from Cologne will come to the conference, or the king of Spain will be annoyed.
  - c. If the professor of linguistics from Cologne comes to the conference, the king of Spain will be pleased.
  - d. The professor of linguistics from Cologne might come to the conference.
- (4)
  - a. If there is a unique professor of linguistics from Cologne, then the professor of linguistics from Cologne will come to the conference.
  - b. Either there is not a unique professor of linguistics from Cologne, or the professor of linguistics from Cologne will come to the conference.
  - c. If there is a unique professor of linguistics in Cologne and the professor of linguistics from Cologne comes to the conference, then the king of Spain will be pleased.

Things pattern here exactly as predicted if existence and uniqueness are presuppositions rather than entailed content—projection from the sentences in (3), and filtering in the sentences in (4). The standard line in contemporary e-type work takes this evidence at face value, and treats the uniqueness and existence content of definite descriptions as presuppositions. Our criticism will only target such views, and we will use 'e-type view' to denote specifically those e-type theories that take on this commitment. This terminology is somewhat narrow, since there have been Russellian developments of

<sup>5</sup> The idea that definite descriptions trigger presuppositions goes back to Frege and Strawson, but see Heim (1991) for an authoritative statement of it.

the e-type view; but those views are in the minority, and leave it unclear how to make sense of the data just summarized.

## 2.2 Situations

The second assumption of modern e-type semantics is that *minimal situations* play a key role in the evaluation of definites.

We have just seen evidence that, if uniqueness implications are part of the meaning of definites (a central commitment of e-type theorists), then they are presuppositions. But when we look around a bit—in particular when we return to donkey anaphora—this is *prima facie* implausible. To give a flavor of the problem, consider the donkey sentences below, which spell out (1) and (2) with overt definite descriptions:

- (5) Every man who owns a donkey pays taxes on the donkey he owns.
- (6) Always, if a man owns a donkey, the man pays taxes on the donkey he owns.

It looks as if e-type theories, by way of their commitment to uniqueness presuppositions, are committed to the claim that (1) and (2), and their corresponding glosses in (5) and (6), should trigger a uniqueness presupposition that every man who owns a donkey owns exactly one donkey. This is because the standard assumption about presupposition projection in the nuclear scope of quantifiers or the consequents of conditionals is that any presuppositions of the material in that environment which are not entailed by the restrictor/antecedent will project from the whole sentence. E-type views take definites to presuppose existence and uniqueness, but take indefinites to have classical existential semantics and thus to only entail existence—not uniqueness. That means that it looks like, while *existence* presuppositions will not project out of sentences like (1), (2), (5), and (6), *uniqueness* presuppositions will: all these sentences will presuppose that the relevant men have at most one donkey.<sup>6</sup> But this prediction is wrong, as is already intuitively clear in these cases: a sentence like (5) or (6) could be true of a group of men, each of whom owns more than one donkey, provided they each pay taxes on each donkey they own. This can be brought out dramatically by looking at sentences like Heim's (1982) (7):

- (7) Everybody who bought a sage plant here bought eight others along with it.

If (7) presupposed that everyone, or even someone, who bought a sage plant bought at most one sage plant, then (7) could only be true in the trivial case, i.e., if no one bought a sage plant. But clearly (7) can be true in non-trivial cases—for instance, in a case in which everyone who goes to the plant store buys nine sage plants. Somehow, then, e-type theories will have to be modified so that uniqueness does not project from donkey sentences.

The main response to this problem in the e-type tradition maintains that definites do indeed have uniqueness presuppositions, but that they fail to project in donkey

<sup>6</sup> Or at least that some relevant man has only one donkey; there is controversy about how the projected presupposition is quantified (see e.g. Beaver 2001), but we can set this aside because sage plant sentences (to be discussed below) make clear that either prediction is wrong.

sentences because the definites' presuppositions are evaluated relative to very *small* points of evaluation, points which are small enough that uniqueness presuppositions can be unproblematically satisfied in a local sense. In more detail: this approach treats the uniqueness implications of donkey anaphora as relative to situations<sup>7</sup> or events,<sup>8</sup> rather than relative to whole worlds.<sup>9</sup> The gist of the idea is that our donkey sentences will end up having the meaning in (8):

- (8) Every minimal situation  $s$  in which a man owns a donkey can be extended into a larger situation  $s'$  in which the man in  $s'$  pays taxes on the donkey he owns in  $s'$ .

Heim (1990a),<sup>10</sup> using the situation-semantic framework of Kratzer (1989), sketches a semantics which yields meanings like (8) for sentences with donkey anaphora. The key point about this gloss is that the situation  $s'$  in which we evaluate the definite 'the donkey he owns' can be very *small*, and plausibly contains just one donkey, meaning that the uniqueness presupposition is locally satisfied and thus will be filtered. Similar moves can be made for conditionals: indefinites in the antecedent filter the *existence* presupposition by way of their classical semantics; and by making the situations relative to which the definites/pronouns are evaluated suitably small, we can ensure that the uniqueness presuppositions are also filtered.

As is well known, this approach still needs some refinement to deal with sage plant sentences. The problem is that any situation that makes the nuclear scope of those

<sup>7</sup> As in Heim (1990a), following Berman (1987), and most of the literature since, e.g. Büring (2004), Elbourne (2005), Elbourne (2013). See Dekker (1997) for extensive discussion of the framework of minimal situations. Dekker gives a translation between the talk of "cases" common in dynamic semantics and the talk of situations in e-type semantics. But Dekker is bracketing issues about anaphora—he treats a limited language without definites—so the existence of this translation does not by any means show that there is a meaning-preserving translation between these theories once they incorporate definites, and thus does not show there is no empirical difference between the predictions of e-type and dynamic theories, which (as we are understanding these terms) encompass very different claims about the semantics of (in)definites. We should emphasize that, as we understand it (and as Dekker emphasizes), dynamic semantics can be spelled out in a way that incorporates situations: the essential difference between e-type and dynamic theories does not concern whether there is a role for situations in the theory, but rather the treatments of (in)definites sketched above.

<sup>8</sup> As in Ludlow (1994), Schein (1993).

<sup>9</sup> A different response to this problem suggested by Davies (1981) and Neale (1990) is to treat the definites in question as 'numberless' descriptions (optionally plural rather than singular). On this idea, the pronoun in (1) spells out not as just 'the donkey he owns', but also possibly as 'the donkeys he owns'. The idea is that this makes the uniqueness implication optional and hence not observable. But many of the readings of donkey anaphora are not, in fact, equivalent to what we get with a plural description. Compare, for instance, (i) with (ii):

- (i) Every man who owns a donkey and pays tax on it is disgruntled.  
(ii) Every donkey-owner who pays tax on the donkeys he owns is disgruntled.

For (i) to be true everyone who pays tax on at least one donkey he owns needs to be disgruntled, while for (ii) to be true it seems we only need every donkey owner who pays tax on *every* donkey he owns to be disgruntled. Other powerful arguments against the numberless view can be found e.g. in Kanazawa (2001).

<sup>10</sup> References to Heim can be a bit confusing since Heim developed both one of the original dynamic systems (1982) and a prominent version of the e-type theory that we discuss here (1990a); we try to specify whenever it is unclear which publication we are referring to.

sentences true will have nine sage plants in it, so the uniqueness of the definite in the scope can't be satisfied at that situation. So, somehow we need the uniqueness presupposition of the definite in the scope to be checked relative to minimal restrictor situations. In other words, we want a gloss along these lines:

- (9) Every minimal situation  $s$  in which a person buys a sage plant can be extended into a larger situation  $s'$  such that the person who bought the unique-sage-plant-in- $s$  buys eight other sage plants in  $s'$ .

Here we evaluate the definite in the nuclear scope relative to minimal restrictor situations, which will thus satisfy the uniqueness presupposition of the definite when they contain a corresponding indefinite. In Sect. 4, we provide a compositional implementation which gets us this desired co-variation between definites in the nuclear scope and indefinites in restrictors.

For the rest of this paper we will focus our attention on e-type approaches which are developed in this situation framework, as it is the best-developed version of the e-type view and seems to us very well motivated by the present considerations. We will, again, use 'e-type' somewhat narrowly to denote theories that are committed to this situation-based (or event-based) framework and the presuppositional assumption motivated in the last subsection, in addition to the two central planks above. Again, we emphasize that our criticism does not touch views which do not make these first two assumptions, but, again, those assumptions are well motivated, and are more or less standard in contemporary e-type views.

### 3 Definiteness projection

Our central point *contra* e-type theories will be that this way of getting rid of troublesome uniqueness presuppositions by using minimal situations is too narrow. Glosses like (9) eliminate uniqueness inferences by way of specially designed semantics for quantifiers and conditionals which check the uniqueness presuppositions of definites in nuclear scopes/consequents against minimal situations which satisfy the restrictor/antecedent. But presupposition projection and filtering is not limited to quantifiers or conditionals; and the very same phenomena which motivate this move to minimal situations for quantifiers and conditionals show up in a variety of other environments. In general, we will now argue, indefinites can filter the uniqueness presuppositions of definites; whereas e-type approaches predict that the uniqueness presuppositions of definites will project even when there is a preceding indefinite, since indefinites entail existence but not uniqueness.

In this section, we will argue in more detail for this empirical generalization, explaining along the way why it is a serious problem for e-type theories. Then we will explore how e-type theories might respond, and then we will explore the situation for dynamic theories.

### 3.1 Intersentential anaphora

We'll come at this problem in a somewhat indirect way, by starting with cases of intersentential anaphora. The lack of uniqueness implications in intersentential cases formed one of the major motivations for Heim's dynamic file-change semantics (1982, 1983a) and Kamp's discourse representation theory (1981). Heim (1982, Ch. I.1), in particular, makes powerful arguments that the uniqueness presuppositions predicted by the e-type account are unwarranted in cases of intersentential anaphora. However, it seems to be assumed in the recent literature on e-type theories with situations, including Heim's own later work, that adding situations to the e-type story eliminates this problem. Here we argue that intersentential anaphora, in fact, still presents a striking challenge to e-type theories, even if they are equipped with the apparatus of situations. This issue is explored in more detail in work in progress by Lewis (2019).

A reason why we might suppose that intersentential anaphora is *not* a problem for e-type theories has to do with what has been called the problem of the *formal link*. Consider this contrast:

- (10)    a. Laila is a bike-owner. ?It's really old.  
           b. Laila owns a bike. It's nice.

Both dynamic accounts and sophisticated e-type accounts can easily explain this contrast. Dynamic accounts explain it directly by dynamically binding the pronoun in the second sentence of (10b) to the indefinite in the first; the lack of an indefinite in (10a) accounts for the contrast above. In e-type stories the explanation instead goes by way of conditions on how the descriptive material in pronouns is reconstructed from preceding linguistic material: the hypothesized *formal link* between a descriptive pronoun and the preceding linguistic material that furnishes descriptive content (Heim 1990a; Neale 1990; Elbourne 2005). There are various ways of spelling out this idea; we will simply grant for the sake of argument that one of these versions is successful in accounting for the contrast between (10a) and (10b).

A theory of the formal link may help account for contrasts like those in (10), but it misses a more basic problem about intersentential anaphora. That problem can be seen most easily by focusing directly on definite descriptions, where no formal links are needed.

To see the issue, consider the following example. Suppose that John works at a coffee shop and is telling us about his day. He says one of the following:

- (11)    a. A couple came in today. It was a woman and a man. The man was being so annoying.  
           b. A couple came in today. The man was being so annoying.

These passages are both felicitous. This is to be expected on an e-type story. In (11a), the second sentence makes explicit that there was exactly one man, which ensures that the uniqueness presupposition of the definite in the final sentence is satisfied. Presumably, in (11b), we can easily accommodate the same assumption when we come to the definite, again ensuring that its presupposition is satisfied (*accommodation* is the



process by which required presuppositions are quietly added to the common ground; see von Stechow (2008) for an overview).

Now consider these two variants:

- (12) a. Several couples came in today. There was one, a woman and a man. The man was being so annoying.  
b. #Several couples came in today. The man was being so annoying.

Consider first (12b). The definite in the final sentence is jarring. Intuitively, we just don't know which man the speaker is talking about. This is nicely predicted by e-type theories: 'the man' presupposes there is a uniquely salient man, but the first sentence in (12b) makes several distinct men salient, meaning that this presupposition will not be satisfied; nor is it as easy to accommodate the presupposition in (12b) as in the case of (12a) (one would have to accommodate the presupposition that all but one of the couples were lesbian couples, which is an odd thing to presuppose without comment).<sup>11</sup>

But now consider (12a). (12a) is strikingly more felicitous than (12b). But how can e-type theories make sense of this? On reflection, it's not at all clear. The only difference between the two variants (12a) and (12b) is the addition of an intervening sentence, 'There was one, a woman and a man', in the former. But this clearly does not entail that there was only one man in the whole group (to see this, note that this intervening sentence could coherently be followed with 'There was another, two men. . .'). If the uniqueness presupposition of 'the man' is satisfied in (12a), then we will have to say that this intervening sentence makes salient a unique man. But how does it do this? After all, this sentence doesn't tell us anything about the man in question. On reflection, it seems that the uniqueness presupposition of the definite in (12a) should be just as jarring as it is in (12b).

One thing e-type theories could say here is that we generally interpret a definite like 'the man' relative to a minimal situation which makes the preceding sentences true. The problem is that this does not distinguish (12a) from (12b), since minimal situations which make the preceding sentences true will be just those minimal situations in which several couples came in.<sup>12</sup> A different response would be to say something like this: an individual can count as uniquely salient just by virtue of being the one that the speaker intends to refer to; and indefinites can make it clear that the speaker has in mind a uniquely salient individual, even if they don't give us any information about that individual (see Stalnaker 1998). But at this level, it's still not clear how this response distinguishes (12a) from (12b). After all, why don't we just charitably interpret an out-of-the-blue definite as in (12b) as communicating, *inter alia*, that there is a man the speaker has in mind and is going to tell us about?

<sup>11</sup> Note that these observations go against the claim made by Evans (1977) and Kadmon (1987, 1990) that definite descriptions and pronouns *generally* come with uniqueness implications even when in positions of dynamic binding. While there may be some cases of bound pronouns or definite descriptions giving rise to uniqueness inferences such as in the examples given by Evans and Kadmon, we think these cases are rare and should be explained by other mechanisms. For related early discussion see Heim (1982, Ch. 1)

<sup>12</sup> We could say we look at minimal situations which make only the preceding sentence true, but this won't help, since we could add a sentence in between the second and third in (12a) without degrading the sequence: '. . . There was one, a woman and a man. It was early in the day. The man . . . '.

Perhaps there is something to say here.<sup>13</sup> We will not argue at length that e-type theories cannot account for the contrast in (12) (again, see Lewis 2019 for more discussion of these issues). Our main point will be a different one. E-type theories face a very general problem, of which (12) raises the simplest instance of namely, explaining how indefinites in presupposition-filtering positions can filter the uniqueness implications of definites, as in (12a). Let us reiterate that this problem is quite distinct from the problem of the formal link. Indeed, we have spelled out the problem with overt definite descriptions rather than pronouns, so it's not even clear that a formal link plays any role in these sentences; even if we want to say that definite descriptions can also have covert material drawn from preceding sequences, it's clear that this won't help explain the contrast between (12a) and (12b).

### 3.2 Definiteness projection, schematically

Our main point is the following: indefinites appear to filter the uniqueness presuppositions of definites. This is the phenomenon we call *definiteness filtering*. Schematically, let ' $\exists FG$ ' abbreviate an indefinite sentence like 'An  $F$  is  $G$ ' and let ' $\iota FH$ ' abbreviate a definite sentence of the form 'The  $F$  is  $H$ ' or 'He/she/it is  $H$ ', in cases where the latter is intuitively interpreted the same way as the former. Let  $\mathcal{F}(\cdot, \cdot)$  range over functions that take a pair of sentences to a sequence of sentences, with the property that the first argument filters the presuppositions of the second in that sequence—so  $\mathcal{F}(\varphi, \psi)$  could be ' $\varphi$  and  $\psi$ ', or ' $\neg\varphi$  and  $\psi$ ', or ' $\neg\varphi$  and  $\neg\psi$ ', or ' $\neg\varphi$  and  $\neg\psi$ ', and so on (more on sequences like this presently). With this terminology in hand, we can restate our basic observation more precisely:

*Definiteness projection:*

- *Definiteness filtering:* A sequence of the form  $\mathcal{F}(\exists FG, \iota FH)$  does not communicate that there is a uniquely salient  $F$ .
- *Uniqueness inferences:* By contrast, a sequence of the form  $\mathcal{F}(\varphi, \iota FH)$  generally does communicate that there is a uniquely salient  $F$  whenever  $\varphi$  does not contain an indefinite of the form ' $\exists FG$ '.

From the point of view of e-type theories, the first part of this generalization, definiteness filtering, is surprising. On e-type theories, indefinites have a classical existential semantics; and definites presuppose both existence and uniqueness. On standard theories of presupposition projection, in a sequence of the form  $\mathcal{F}(\varphi, \psi)$ ,  $\varphi$  filters exactly the presuppositions of  $\psi$  which it entails; the other presuppositions of  $\psi$  project.<sup>14</sup> So in the context of an e-type theory, we would expect indefinites to filter just existence,

<sup>13</sup> See again Stalnaker (1998), for instance, for a development of the idea that indefinites implicate that the speaker has someone in mind, and Lewis (2013) for further criticism.

<sup>14</sup> In fact the standard prediction is a bit more subtle: namely, that the presuppositions of  $\psi$  project *conditioned on*  $\varphi$ . However, this is a notoriously problematic prediction (the so-called *proviso problem*; see e.g. Geurts 1996; Heim 2006; Mandelkern 2016); it is well known that what in fact is felt to intuitively project is the set of unconditional presuppositions not entailed by  $\varphi$ . We will assume here, and throughout, that we have an underlying theory of presupposition that provides some solution to the proviso problem, and hence will ignore this subtlety, which in any case does not effect our main point.

not uniqueness. As we have seen, e-type theories give special semantics for quantifiers and conditionals to account for definiteness filtering in those cases. But this is a local solution to what we will argue is a global problem. (In Sect. 4, we will explore to what degree the local solution proposed for quantifiers and conditionals, involving minimal situations, can be extended across the board.)

The argument of this section in turn yields a new perspective on the observation about intersentential anaphora made just now. That observation could easily be interpreted as an observation about discourse-level pragmatics: for an e-type theory to account for that observation (it would be natural to think), we must simply couple it with the right story about the evolution of discourse-level salience properties. The observations in the rest of this section will show this reaction to be wrong. On the contrary, the intersentential problem is just one instance of a much more pervasive phenomenon, in which indefinites filter uniqueness presuppositions across the board.

The rest of this section will be dedicated to showing that definiteness filtering occurs across a wide variety of different filtering environments. This risks tedium, but it is important to see that the phenomenon is indeed a global one that is robust across different presupposition-filtering environments.

### 3.3 Conjunctions

We begin by considering conjunctions. Left conjuncts filter the presuppositions of right conjuncts, so (13a) does not presuppose that Susie used to smoke, whereas (13b) does:

- (13) a. Susie used to smoke and she stopped.
- b. Susie ran a marathon and she stopped smoking.

So conjunctions with the form  $\lceil \varphi$  and  $\psi \rceil$  presuppose all the presuppositions of  $\psi$  which are not contextually entailed by  $\varphi$ . We can thus compare conjunctions with the form  $\lceil \exists F G$  and  $\iota F H \rceil$  to conjunctions with the form  $\lceil \varphi$  and  $\iota F H \rceil$  for some other  $\varphi$ , like (14) and (15), respectively:

- (14) John met a woman at the party and John liked [her/the woman].
- (15) John enjoyed the party and John liked [her/the woman].

Recall that e-type theories treat ‘her’ in an environment like (14) as equivalent to a definite description which presumably will be spelled out as something like ‘the woman’, so we can move freely between these variants. On its own, conjunction cannot show us a great deal about projection, since a conjunction entails both its conjuncts, which makes it impossible to directly distinguish simple entailments of the conjunction from its presuppositions. But we can distinguish these by embedding conjunctions in environments which (i) cancel entailments but (ii) are holes for presupposition projection. Then, if some content is just an entailment of a conjunction, we will no longer infer that content; whereas if it is a presupposition of the conjunction, we will.

One such environment is the antecedent of conditionals: (16a) does not lead us to infer that Susie used to smoke, whereas (16b) does:

- (16) a. If Susie used to smoke and she stopped . . .  
 b. If Susie ran a marathon and she stopped smoking . . .

So we can embed our target sentences in the antecedents of conditionals, as in (17a) and (17b):

- (17) A: John met a woman at the party.  
 a. B: Well, if John met a woman and John liked [her/the woman], he'll be happy he went to the party.  
 b. B: Well, if John enjoyed the party and John liked [her/the woman], he'll be happy he went to the party.

The key question to now ask is whether (17a) or (17b) presupposes that there is a uniquely salient woman—in other words, whether this presupposition of ‘her/the woman’ projects out of each of these sentences (which would show that it projects out of the relevant conjunction). We can’t really tell from these two sentences, since A’s set-up can be naturally interpreted to make a unique woman salient (the one he met), so the presupposition would be satisfied in any case. But we can vary the context set-up, to make explicit that John may have met more than one woman. Then, if uniqueness projects, we should find a clash with the context. So consider (18):

- (18) A: John met one or two women at a party.  
 a. B: Well, if John met a woman and John liked [her/the woman], he'll be happy he went to the party.  
 b. B: # Well, if John enjoyed the party and John liked [her/the woman], he'll be happy he went to the party.

Given this plural contextual set-up, there is a striking contrast between (18a) and (18b): the latter is infelicitous, while the former is still good. (17) and (18) constitute a minimal pair: the only change is that in the context for the first there is plausibly a uniquely salient woman, while in the second case there is not. Since both variants—(18a), with an indefinite preceding the definite, and (18b), with a definite but no indefinite—were felicitous in the set-up in (17), this suggests that the infelicity of (18b) follows specifically from the fact that no unique woman is made salient in the set-up in (18). This diagnosis of the weirdness of (18b) is confirmed by the fact that a natural reaction to (18b) is ‘Hey wait a minute, I thought you said that John met one *or two* women at the party!’ (see von Stechow 2008 for this test). All this, in turn, suggests that a conjunction containing a definite without a preceding indefinite, as in (15), presupposes uniqueness, while a conjunction with a definite following an indefinite does not, as in (14).

The same points can be made with conjunctions in the consequents of conditionals. Compare:

- (19) A: John was supposed to go to a party with [a woman/one or two women] he has been chatting with online.  
 a. B: If John went to the party, then he apparently met a woman and he liked [her/the woman].

- b. B: If John went to the party, then he apparently enjoyed the party and he liked [her/the woman].

The key observation here is that (19b) is infelicitous in the plural context ('one or two women'), whereas all other variants are felicitous. This provides more evidence that (15), but not (14), presupposes uniqueness, since the standard assumption is that conditionals presuppose the presuppositions of the consequent which are not entailed by the antecedent.

Similarly—unsurprisingly—we find further evidence for this from conjunctions in the restrictors of quantifiers. Thus compare:

- (20) The men in my class went to a party, and most men met [a woman/one or two women].
- a. Every man who met a woman and liked [her/the woman] is happy he went to the party.
  - b. Every man who enjoyed the party and liked [her/the woman] is happy he went to the party.

Again, (20b) is infelicitous in the plural context, while all other variants are felicitous. This, together with the assumption that presuppositions project out of the restrictors of quantifiers,<sup>15</sup> provides further support for the claim that (15), but not (14), presupposes uniqueness. We invite the reader to find more evidence by embedding the corresponding conjunction in the nuclear scope of quantifiers, attitude ascriptions, modals, and so on, but the verdict seems clear enough for us to stop here.

This puts us in a position to spell out in more detail the problem for e-type theories in the context of conjunction. Again, according to standard theories of presupposition, the presuppositions of a right conjunct project out of the conjunction as a whole unless they are entailed by the left conjunct (plus contextual information). As we know, on e-type theories, 'her/the woman' presupposes that a woman exists, and that there is a uniquely salient woman. 'A woman' entails existence, but, of course, not uniqueness. In other words, existentials in left conjuncts should be able to filter existence presuppositions, but not uniqueness presuppositions. So it looks like e-type theories should predict that *both* 'John enjoyed the party and John liked [her/the woman]' and 'John met a woman and liked [her/the woman]' presuppose that there is a uniquely salient woman. This prediction looks correct for the former but, crucially, not the latter conjunction: it appears that indefinites can filter the uniqueness presuppositions of definites.

An important worry to discuss at this point concerns the logical form of our conjunctions. We have assumed that we are dealing with conjunctions of the form  $\lceil \exists F G \text{ and } \iota F H \rceil$ ; but what if our conjunctions instead have the form  $\lceil \exists_x F : (G \text{ and } \iota_x F H) \rceil$ , with the indefinite scoping over the whole conjunction and somehow binding a covert variable in the definite? In other words, we have assumed that our conjunctions have the form 'John (met a woman) and (he liked the woman)'; but what if they instead have a form along the lines of 'a woman<sub>x</sub> (John met *x* and liked the<sub>x</sub> woman)'?<sup>16</sup> If

<sup>15</sup> It is uncontroversial that they project in at least *some* manner—existential or universal—which is all we need for the present.

<sup>16</sup> Thanks to Yasu Sudo and Karen Lewis for raising this objection and for subsequent discussion.

that were so, there would be no puzzle about why these conjunctions do not project uniqueness, while the corresponding definite conjuncts on their own do. But we think there are a few reasons to think this is not a plausible response. First, as we will see in a moment, it is too local, given that our problem extends beyond conjunction to many cases where no similar response is available. Second, even when it comes to conjunction, we can vary our examples in a way that renders this response untenable, for instance by adding an exceptive clause to our key sentence:

(21) A: John met one or two women at the party.

B: If John, but not Mark, met a woman, and John liked [her/the woman], John will be happy he went to the party.

Adding this exceptive clause doesn't change judgments about felicity: (21) seems not to project uniqueness, since it is felicitous in this plural context. The most prominent interpretation of (21) says that John will be happy provided that (i) John met a woman  $x$  and (ii) Mark didn't meet *any* woman and (iii) John liked  $x$ . But if the indefinite took scope over the conjunction, then of course we would get a different meaning: namely, that John will be happy provided that there is a woman  $x$  such that (i) John met  $x$  and (ii) Mark didn't meet  $x$  and (iii) John liked  $x$ . Of course, this latter reading *is* available, though dispreferred. The key point, though, is that on the first (more prominent) reading, we don't get projection of uniqueness. But to obtain that first reading, we must assume that the indefinite does *not* take scope over the conjunction (if it did, we would only get the second reading). Thus this scopal escape route isn't available in cases like this one.<sup>17</sup>

If we accept the pattern in question, how could e-type theorists respond? Can small situations help us here, as they did for filtering between the restrictor and nuclear scope of quantifiers, and likewise between the antecedents and consequents of conditionals? It is tempting to think that all we care about when we evaluate a conditional, or quantifier, are *minimal* situations which make any part of it true—and that we simply ignore the situations that make definites undefined. But the problem with this, of course, is that, while it would eliminate the uniqueness presuppositions of  $\lceil \exists FG \rceil$  and  $\lceil FH \rceil$ , it would also eliminate the uniqueness presupposition of  $\lceil \iota FH \rceil$ . In other

<sup>17</sup> An anonymous reviewer for this journal suggests that, on an elision approach to exceptives (as in Vostrikova 2019), we might be able to say that the pronounced indefinite takes high scope over the conjunction in (21) while the elided indefinite in the exceptive takes low scope. But in general this kind of scope configuration doesn't seem possible for exceptives: when the pronounced indefinite unambiguously takes high scope, we do not seem to get a reading where the indefinite in the exceptive takes low scope. To see this, consider (i):

(i) If there's a woman who John met, but Mark didn't, then Mark will be jealous.

If it were possible for the indefinite in the exceptive to take low scope while the pronounced indefinite takes high scope, then this should have a reading where it means (ii):

(ii) If there's a woman who John met, but Mark didn't meet a woman, then Mark will be jealous.

But (i) doesn't seem to have this reading. So even if exceptives are derived by elision, it looks as if (somewhat unsurprisingly) the scope of indefinites must be preserved in the elided portion, and so (21) could not have a reading where the pronounced indefinite scopes high and the elided indefinite scopes low.

words, it would not help capture the contrast that needs to be captured.<sup>18</sup> A more local solution would develop a sort of pseudo-dynamic conjunction, which passes on minimal left-conjunct-witnessing situations for the right conjunction to evaluate; in Sect. 4 we discuss a proposal along those lines, arguing that while it might work for conjunction and disjunction, it cannot be conservatively generalized far enough.

### 3.4 Disjunctions

We turn next to disjunctions. The standard assumption about projection across disjunction is that presuppositions of a right disjunct are filtered by the negation of the left disjunct: that is,  $\lceil \varphi \text{ or } \psi \rceil$  has all the presuppositions of  $\psi$  except those which are contextually entailed by  $\lceil \text{Not } \varphi \rceil$ . So (22a) does not license the inference that she used to smoke, while (22b) does:

- (22) a. Sue never smoked, or she stopped.  
b. Sue didn't run a marathon, or she stopped smoking.

So the relevant comparison for present purposes will be between sentences of the form  $\lceil \text{Not}(\exists FG) \text{ or } \iota FH \rceil$  versus  $\lceil \varphi \text{ or } \iota FH \rceil$ , where  $\varphi$  is not a negated indefinite, as in (23):

- (23) A: I heard from John that Sue met [a girl/a few different girls] this fall.  
a. B: Really? Well, she came to Thanksgiving by herself, so either she didn't actually meet a girl, or else she didn't like [her/the girl] enough to bring her to Thanksgiving.  
b. B: Really? Well, she came to Thanksgiving by herself, so either she didn't want her mother to get involved, or else she didn't like [her/the girl] enough to bring her to Thanksgiving.

Once again, our two contexts provide us with a minimal pair. With the singular context, both variants are felicitous; in the plural context, only the first is. This suggests that uniqueness is filtered by the negated definite in (23a), but projects in (23b)—conforming to the general pattern we are arguing for here: indefinites filter uniqueness presuppositions.

Let us again consider, and again reject, the idea that this issue has something to do with the problem of the formal link. E-type theorists might argue that there is material in the indefinite sentences ('meet a girl') that is lacking in the indefinite-free variants. Perhaps, the e-type response might go, that material provides a suitable antecedent for elided material in the definite, accounting for the contrast between the variants; in that case, this would be just another species of the formal link problem. But the examples were carefully constructed so that the indefinite sentence *didn't* introduce material that was not already in the context sentence. In any case, we can make this material overtly available, as in (24), without any improvement in felicity:

<sup>18</sup> Cf. Büring's (2004) closely related point that indefinites and definites in general end up being indistinguishable in the antecedents of conditionals if we rely in the wrong ways on minimal situations.

- (24) A: I heard from John that Sue met a few different girls this fall.  
 B: # Really? Well, she came to Thanksgiving by herself, so either she didn't want her mother to get involved, or else she didn't like the girl she met enough to bring her to Thanksgiving.

Similar points go for the other examples we consider throughout this section: we do not see how appeals to formal links can help account for these contrasts.

Disjunction is a somewhat complicated case. In order for a disjunction with the form  $\lceil \text{There's not an } F, \text{ or the } FG \rceil$  to be felicitous, it must remain open that there is no  $F$ . In order to test whether uniqueness projects in these cases, we need to also leave open the possibility that there is more than one  $F$ . We achieved this in (23) by ascribing to a possibly dubious source the information that Sue met one girl/a few different girls. We can also achieve this by embedding disjunctions in the scope of quantifiers or the consequents of conditionals. Consider first the quantified sentence in (25):

- (25) Some of my friends have joined Tinder. Some of them have gone out with one girl [and some with several]. But I didn't meet any of their dates at my party.
- a. So all of my friends either didn't meet a girl or else didn't bring [her/the girl] to my party.
  - b. So all of my friends either aren't on Tinder or else didn't bring [her/the girl] to my party.

Consider next the conditionals in (26):

- (26) A: Some of my friends have joined Tinder. Some of them have gone out with one girl [and some with several]. But I didn't meet any of their dates at my party.
- B: I see. So if Sue is in your friend group, then...
- a. either she didn't meet a girl or else she didn't bring [her/the girl] to your party.
  - b. either she isn't on Tinder or else she didn't bring [her/the girl] to your party.

In both these cases, when the plural context set-up in brackets is omitted, both continuations are fine. Whereas when it is included, only the first variants, with a negated indefinite in the left disjunct, are acceptable. This provides further evidence that negated indefinites can filter uniqueness across disjunctions.

### 3.5 Attitudes

Attitude reports provide another filtering environment to test our hypothesis that indefinites filter uniqueness. There are a variety of different ways we can use attitude reports to test this. One helpful paradigm comes from 'want'-'want' sequences: in sequences of the form  $\lceil S \text{ wants } \varphi. S \text{ wants } \psi. \rceil$ ,  $\varphi$  filters any presuppositions of  $\psi$  which it entails, while other presuppositions project (thus e.g. 'Sue wants to have a guitar. She



wants to play her guitar in a band' does not presuppose that Sue has a guitar, while 'Sue wants to be in a band. She wants to play her guitar in the band' does).<sup>19</sup> So we can compare sequences of the form  $\lceil S \text{ wants } \exists FG. S \text{ wants } \iota FH. \rceil$  versus  $\lceil S \text{ wants } \varphi. S \text{ wants } \iota FH. \rceil$  in uniqueness and non-uniqueness environments, as in (27):<sup>20</sup>

- (27) Mark told me he is going to meet [a guy/one or two guys] at a bar.
- a. He wants to meet a man. He wants [him/the man] to be interesting.
  - b. He wants the bar to be nice. And he wants [him/the man] to be interesting.

Once again, we find a contrast here between (27b), in the plural context, and the other variants: (27b) is infelicitous in the plural context, which suggests that it presupposes that there is a uniquely salient man, while (27a) is felicitous in both contexts, suggesting that the presupposition is filtered there—again supporting our claim that, in general, indefinites filter uniqueness for definites. We leave it to the reader to explore similar patterns with other attitude predicates, like 'hope'-'hope', 'wish'-'wish', and so on.

### 3.6 Modals

Necessity modals, like attitude predicates, create filtering environments: where ' $\Box$ ' is a necessity modal, in a sequence  $\lceil \Box \varphi. \Box \psi \rceil$ ,  $\varphi$  will filter any presuppositions of  $\psi$  which  $\varphi$  entails; other presuppositions will project (so 'You must stop drinking. You must then stop smoking' presupposes that you smoke, while 'You must start smoking. You must then stop smoking' does not). Thus we can compare  $\lceil \Box \exists FG. \Box \iota FH. \rceil$  with  $\lceil \Box \varphi. \Box \iota FH. \rceil$  and see whether uniqueness projects from one or both of these. Once again, we find evidence that the indefinite filters uniqueness. Here is a paradigm that shows this with an epistemic necessity modal:

- (28) A: I think Liz had [a baby/a baby, or maybe even twins].  
 B: Yeah, I saw her and John buying diapers; she looked tired.
- a. She must indeed have had a baby. Taking care of [it/the baby] must be overwhelming.
  - b. She must be getting help from John. Still, taking care of [it/the baby] must be overwhelming.

Again, the variant without the indefinite, in (28b), is infelicitous in the plural context, whereas the variant with the indefinite in (28a) is not, providing further evidence that indefinites filter uniqueness.

<sup>19</sup> There is controversy, related to the proviso problem mentioned above, about whether this projection is unconditional, or whether projection is conditioned on the beliefs of the attitude holder and unconditional "projection" follows as a secondary inference; but this won't matter for our purposes (Heim 1992; Geurts 1998; Sudo 2014).

<sup>20</sup> Elbourne (2005, Sect. 2.6.2) discusses sequences like (27a), but does not give an account of their meaning and does not note the problem they raise concerning uniqueness.

We find a similar pattern with other kinds of necessity modals, as with deontic necessity modals:

- (29) John adopted [a cat/one or two cats].
  - a. In fact, he had to adopt a cat; he had to adopt [her/the cat] to keep his mother company.
  - b. He had to find a way to keep his mother occupied; so he had to adopt [her/the cat] to keep his mother company.

Once again, the variant without the indefinite is infelicitous in the plural context, whereas the variant with the indefinite is felicitous.

### 3.7 Generalized sage plant sentences

The last part of our argument for definiteness projection generalizes Heim's (1982) argument from sage plant sentences like (7), repeated below:

- (7) Everybody who bought a sage plant here bought eight others along with it.

Recall that Heim used this sentence to argue that pronouns like 'it' in (7) cannot possibly project uniqueness, as this would render the sentence trivial. We can generalize Heim's approach to provide a different strategy for arguing that indefinites filter uniqueness in all the projection environments we have considered so far. To see this, consider the following variations on (7), which extend the sage plant paradigm to conjunction, disjunction, 'want' sequences, and modal sequences.

- (30) Sue bought a sage plant and bought eight others along with [it/the sage plant].
- (31) Either Sue didn't buy a sage plant, or she bought eight others along with [it/the sage plant].
- (32) Sue wants to buy a sage plant. She wants to buy eight others along with [it/the sage plant].
- (33) Sue has to buy a sage plant. She has to buy eight others along with [it/the sage plant].

These sentences are all perfectly coherent. This coherence provides independent evidence that definites like 'it'/'the sage plant' do not project uniqueness in these environments. If they did, these sentences would be incoherent in different ways. (30) would be simply inconsistent, since it can't be that Sue bought exactly one sage plant along with eight other sage plants. (31) would be incoherent in that the second disjunct would be trivially false—Sue can't possibly have bought eight sage plants along with the unique sage plant she bought. (32) would ascribe incoherent desires to Sue. And (33) would ascribe incoherent requirements to her. None of these sentences are incoherent in this way. These judgments of coherence seem very clear to us. This

provides yet another argument that indefinites can filter uniqueness, not just between a restrictor and scope, but in general across presupposition projection environments.

These sentences can also be varied to provide further evidence for the claim that, without a filtering indefinite, definites project uniqueness. If we change the indefinite predicate ‘buy a sage plant’ to ‘go to the plant store’ in these examples, then the sentences become incoherent:

- (34) ??Sue went to the plant store and bought eight sage plants along with the sage plant she bought.
- (35) ??Either Sue didn’t go to the plant store, or she bought eight sage plants along with the sage plant she bought.
- (36) ??Sue wants to go to the plant store. She wants to buy eight sage plants along with the sage plant she wants to buy.
- (37) ??Sue has to go to the plant store. She has to buy eight sage plants along with the sage plant she has to buy.

This incoherence is of course readily explained if definites without filtering indefinites project uniqueness.

Generalized sage plant sentences thus provide further support for definiteness projection. But they do so in a particularly simple way. By contrast to the arguments that we have looked at so far, in the present case the only relevant judgment is whether a given sentence (or sequence of sentences) is coherent; we do not need to reflect on different contexts of assertion in order to see that uniqueness doesn’t project when there is a filtering indefinite, and does otherwise.

## 4 Prospects for an e-type theory

We have argued that indefinites filter the uniqueness presuppositions of definites, while those presuppositions project in other cases. We have argued for this by looking at a wide variety of filtering environments: conditionals, quantifiers, conjuncts, disjuncts, attitude reports, and modal claims. In each of these environments, we have shown that, when there is a definite in the filtered position and an indefinite in the filtering position, there is no corresponding uniqueness inference; whereas when there is no indefinite in the filtering position, there is a corresponding uniqueness inference. We have shown this both by comparing each of these variants in singular versus plural contexts; and by exploring variants of sage plant sentences in each of these environments. It thus looks as if definites carry an implication of uniqueness; and this implication is filtered by corresponding indefinites. This is our central empirical claim in this paper.

We have claimed that extant e-type theories do not account for this pattern, which, again, we call *definiteness projection*. In this section we will spell out the argument for this claim in more detail, and explore to what extent e-type theories could be modified to account for the observed pattern.

The basic argument is simple, and we will rehearse it one more time. According to e-type theories, indefinites have the semantics of classical existential quantifiers:

sentences containing indefinites just say that something of the relevant kind exists. Sentences containing definites presuppose that a uniquely salient thing of the relevant kind exists. Indefinites entail existence, but not uniqueness; but on standard assumptions, when a sentence  $\varphi$  is in a filtering position relative to a sentence  $\psi$ ,  $\varphi$  will filter exactly the presuppositions of  $\psi$  which  $\varphi$  contextually entails. So e-type theories predict that, in general, indefinites should filter existence but *not* uniqueness—contrary to the observations here that indefinites appear to filter uniqueness.

How might e-type theorists respond to this argument?

Let us begin by dismissing one *prima facie* attractive, but on reflection implausible, response. That response would slightly vary the e-type treatment of indefinites, so that they entail not only existence but also uniqueness. This would, of course, account for definiteness filtering. But it is untenable. For instance, it would make the sage plant sentence (7) equivalent to the variant in (38):

(7) Everybody who bought a sage plant here bought eight others along with it.

(38) Everybody who bought exactly one sage plant here bought eight others along with it.

But these are plainly not equivalent: if (38) is ever true, it is only ever trivially true; whereas, again, (7) can obviously be non-trivially true.

Once we set aside this response, the most natural place to look for a solution to the present problems is by way of the mechanism that e-type theories have used to get rid of certain uniqueness inferences in conditionals and quantified environments: namely, minimal situations. As we saw at the outset, e-type theories predict the lack of uniqueness in donkey sentences by making sure that the scopes/consequents of quantifiers/conditionals can be assessed at minimal situations which witness their restrictors/antecedents. At this point in the dialectic, that move looks rather parochial: the pattern that is accounted for in that case by way of minimal situations is just one instance of a much more general pattern. But perhaps similar moves could be made across the board to account for the more general pattern. We will argue that this strategy has some promise, but hits a wall when it comes to intersentential filtering.

We'll start by laying out in more detail what we take to be a reasonable baseline e-type theory. To begin with, consider a sentence with a definite description like (39):

(39) The cat came in.

If 'the cat' presupposes there is a unique cat, then we don't want to say that this presupposition has to be satisfied in the world as a whole (since it isn't, heaven forbid). A more natural thing to say is that we tend to evaluate sentences like (39) at a *topic situation*:<sup>21</sup> that bit of the world that we are paying attention to or care about in evaluating a sentence like this—and which presumably will only have one cat in it whenever a sentence like (39) is felicitous.

<sup>21</sup> The idea of a topic situation that a sentence is about goes back to Austin (1950); for discussion and references see Kratzer (2019, Sect. 3).

Sentences as a whole are thus evaluated relative to topic situations; sentences embedded under operators can be evaluated relative to shifted situations of various kinds (shifting operators in this context include classic intentional operators, like modals and conditionals, as well as quantifiers, which are classically treated as extensional operators but in the present context are more naturally treated as intensional). In Sect. 2.2 we gave a gloss on sentences involving ‘every’ on which the uniqueness presupposition of definites in scopes/consequents varies with minimal situations which witness the restrictor, so that the presupposition is evaluated relative to those minimal situations. As we discussed, this move is required in an e-type framework to deal with sage plant sentences like (7), repeated again here:

(7) Everybody who bought a sage plant here bought eight others along with it.

There are different ways we could implement this idea; the differences do not really matter for present purposes. For concreteness, here is a simple approach. We assume that definites are indexed with a situation variable, which will provide us with the place to check the definite’s presuppositions. That is, where  $g$  is a variable assignment and  $s$  is a situation:

(40)  $\llbracket [\text{The } F]_i G \rrbracket^{g,s}$

- a. presupposes there is a unique  $F$  in  $g(i)$ ;
- b. where the presupposition is satisfied, is true iff the unique  $F$  in  $g(i)$  is  $G$  in  $s$ .

We assume pronouns are treated the same way, with covert descriptive material somehow made available. We assume further that there are two options for how the situation index on definites is set. One option is to set the index to the topic situation (the option that is presumably taken in (39)). The second option is to set it to a designated variable  $r$  which quantifiers manipulate.<sup>22</sup> We can then give a semantics for quantifiers along the following lines (where  $\leq$  is the parthood ordering on situations):

(41)  $\llbracket \text{Every}_x(p)(q) \rrbracket^{g,s} = 1$  iff, for every  $a$ , for every minimal  $s' \leq s$  such that  $\llbracket p \rrbracket^{g[x \rightarrow a], s'} = 1$ , there is a situation  $s'' : s' \leq s'' \leq s : \llbracket q \rrbracket^{g[x \rightarrow a, s' \rightarrow r], s''} = 1$ .

This will enable us to have a reading available on which sage plant sentences have the correct truth conditions. In particular, we assume that ‘it’ or ‘the sage plant’ in the nuclear scope is indexed with  $r$ . Then its presuppositions will be assessed relative to minimal restrictor situations, which will contain exactly one sage plant, and thus will satisfy its presuppositions. So in particular the uniqueness presuppositions of ‘it’/‘the sage plant’ will be satisfied, yielding intuitive, non-trivial truth conditions for sage plant sentences.

Given these two options, we predict that, for definites in the nuclear scope of quantifiers, there are two ways their uniqueness presuppositions can be satisfied: either

<sup>22</sup> More realistically, as Simon Charlow points out, we will need arbitrarily many such variables; we simplify by assuming that there is just one dedicated such variable.

by being satisfied in the minimal restrictor situations or by being satisfied in the topic situation. This covers the basic cases.<sup>23</sup>

This gives us a reasonable baseline framework for indefinites, definites, and quantifiers.<sup>24</sup> We can now enrich this with a semantics for conditionals along similar lines. Let us emphasize that our aim in laying this out is not to do anything new, but rather simply to lay out in more detail what we take to be a reasonable state-of-the-art e-type theory. This, in turn, lets us think more carefully about how e-type approaches account for donkey sentences, and whether this approach can be extended to deal with definiteness projection.

At an abstract level, an e-type approach like the present one deals with donkey data by giving a semantics on which (i) restrictors/antecedents make available minimal witness situations of the indefinite, and (ii) the semantics of the quantifier/conditional makes sure that the presuppositions of the definite are evaluated at those minimal witness situations. Can the present strategy be extended to account for the same pattern in filtering environments across the board? In other words, can we develop a system in which indefinites in filtering position *always* make available minimal situations against which the presuppositions of the corresponding filtered definite are checked?

To give a sense of what we have in mind, consider an entry for conjunction like this:

$$(42) \quad \llbracket p \text{ and } q \rrbracket^{g,s} = 1 \text{ iff } \llbracket p \rrbracket^{g,s} = 1 \text{ and for some minimal situation } s' \leq s \text{ s.t.} \\ \llbracket p \rrbracket^{g,s'} = 1, \llbracket q \rrbracket^{g[s' \rightarrow r],s} = 1.$$

This extends the apparatus of minimal situations to ensure that in a conjunction with the form  $\lceil \exists FG \wedge \iota FH \rceil$ , uniqueness presuppositions can be satisfied. The idea is that, when we have a definite in a right conjunct indexed with our designated situation variable  $r$ , that definite's presuppositions will be evaluated relative to a minimal left-

<sup>23</sup> A further thing we might say is that these are the *only* available options. This further stipulation is not essential for present points, but it is relevant to the overall picture, as it is a way to ensure that definites and indefinites don't end up meaning the same thing in the restrictors of quantifiers. The point goes back to Büring (2004), who argued using the following sentence that we cannot evaluate uniqueness presuppositions in the situation of evaluation.

(i) Every Athenian worships the goddess.

His thought, in essence, was that (i)'s truth conditions would be as follows:

(ii) In the topic situation  $s$  every minimal situation  $s' < s$  containing an Athenian can be extended to a situation  $s'' : s' < s'' < s$  such that the Athenian in  $s''$  worships the goddess in  $s''$ .

It would seem, then, that (i) would be equivalent to (iii):

(iii) Every Athenian worships a goddess.

However, it is clearly not. Büring thus suggests we restrict the indexing on the definite to avoid this predicted equivalence, forcing an indexing to the restrictor situation or the topic situation. However, we might note that once we add a systematic presupposition projection framework, the uniqueness presuppositions in (i) might project out in a rather strong way, so it is not entirely clear that restrictions on the indexing of definites are really necessary.

<sup>24</sup> It's not clear that this framework can deal with bishop sentences, a classic issue for e-type theories, but we don't have anything new to say about this issue.

conjunct situation; so, if the left conjunct contains an indefinite, those presuppositions will be satisfied.

We can say something similar about disjunction:

$$(43) \quad \llbracket p \text{ or } q \rrbracket^{g,s} = 1 \text{ iff } \llbracket p \rrbracket^{g,s} = 1 \text{ or for some minimal situation } s' \leq s \text{ s.t. } \llbracket p \rrbracket^{g,s'} = 0, \llbracket q \rrbracket^{g[s' \rightarrow r],s} = 1.$$

Whether this works depends on some subtle issues about negation, which is a notoriously complex affair in situation semantics (see Kratzer 1989). However, if we treat negation in the standard Boolean way, then (43) looks like it might do the trick. Suppose a left disjunct is a negated indefinite and the right disjunct contains a definite indexed to  $r$ . The presuppositions of that definite will be evaluated relative to a minimal situation which makes the indefinite true, and hence will be satisfied, as desired.

So there are resources available to e-type theories to extend their treatments of donkey sentences to other connectives. The system sketched here accounts for the data we have reviewed involving conjunctions and disjunctions. Indeed, if the present arguments are correct, it seems that something like this system is in fact forced on e-type theorists. But there are a number of worries one might have about this picture. We will lay out three, in order of increasing seriousness.

First, one might have thought it to be an attractive feature of e-type theories that they can adopt classical semantics for the connectives. Although we don't know of explicit claims to this effect, we suspect that e-type theorists have largely taken for granted that their theories of (in)definites and quantifiers can be coupled with classical connectives, given the lack of discussion in this literature of how to treat 'and' and 'or' in this framework. Critical responses to dynamic semantics have often focused on the fact that dynamic semantics requires apparently arbitrarily non-classical connectives (see Heim 1990b; Soames 1989; Schlenker 2008; Mandelkern 2019). The present discussion, however, suggests that e-type theories are not better off in this respect than dynamic ones, since connectives along the lines of (42) and (43) are decidedly non-classical. In fact, they look somewhat like the standard non-classical connectives of dynamic semantics. So the need for these non-classical connectives may undermine one putative motivation for e-type theories; in any case, it brings e-type theories somewhat closer to dynamic theories.

Second, the pattern of definiteness projection, as we have emphasized, looks like presupposition projection in general: the generalization we argued for was that indefinites filter uniqueness presuppositions of definites whenever those indefinites appear in standard presupposition-filtering environments. The present approach accounts for this pattern in the case of conjunctions and disjunctions, but *not* by treating it as a species of presupposition projection in general: the apparatus of minimal situations in the semantics in (42) and (43) ensures that uniqueness will be filtered by indefinites, but it does not account for presupposition projection more broadly speaking. To see the point, compare again conjunctions like 'Susie used to smoke and she stopped' versus 'Susie ran a marathon and she stopped smoking'. As we saw above, the presupposition of 'Susie stopped smoking', that Susie used to smoke, survives only in the latter of these. The standard way of accounting for this is by means of some kind of asymmetric conjunction (e.g. a dynamic conjunction like that of Heim 1983b, or a middle Kleene

one like that of Peters 1979). But the minimal-situation-passing conjunction in (42) is no help at all in capturing this pattern. In fact, when there is no definite in the right conjunct indexed to  $r$ , the conjunction in (42) is just a classical conjunction. So something more will need to be said about presupposition projection across conjunction. Similar points go, *mutatis mutandis*, for disjunction, and indeed for quantifiers and conditionals.<sup>25</sup> Of course, it is open to e-type theories to say more—to adopt a dynamic or trivalent conjunction which incorporates the architecture of (42), and likewise for disjunction. Our point is simply that the mechanism these approaches take to deal with the filtering of uniqueness does not deal with presupposition projection more generally; and, conversely, whatever accounts for presupposition projection more generally will not account for our pattern, for by-now familiar reasons, since, again, indefinites do not entail uniqueness, and so cannot filter uniqueness presuppositions. In other words, these approaches must take a disjunctive approach to definiteness filtering and presupposition filtering, respectively.

Moreover, this does not seem to be an incidental feature of the system we have developed here: it seems like it will be an essential feature of any e-type system. Consider (44), from an anonymous referee for this journal:

(44) Every farmer who owns a donkey is aware that she has only one donkey.

In (44), the indefinite ‘a donkey’ does not filter the uniqueness presupposition of ‘aware that . . .’, namely that each farmer in question has only one donkey. Instead, (44) intuitively presupposes that every farmer who has a donkey has exactly one donkey. So as a *general* matter, it looks like indefinites cannot filter uniqueness. This is of course not surprising: we would not expect an indefinite, on any plausible semantics, to entail uniqueness, and so we would not expect an indefinite, on any plausible account of presupposition projection, to filter uniqueness presupposition. Thus, if we want to say that definites have uniqueness presuppositions which are filtered by indefinites, as e-type theories do, we simply cannot assimilate this process to presupposition filtering in general. Maybe there are two systems here, one for presupposition filtering and one for the filtering of uniqueness presuppositions in particular. But we have shown that

<sup>25</sup> It is tempting to think that the familiar tool of growing minimal situations might somehow help with presupposition projection. The idea would be this: say that  $\ulcorner \varphi \wedge \psi \urcorner$  is true just in case a part of the situation of evaluation is a minimal  $\varphi$ -situation which can be grown to be a  $\psi$ -situation. But this doesn’t work because of the conjunctive sage-plant sentences discussed above, like ‘Sue bought a sage plant and bought eight other sage plants with it’. The ‘it’ here needs to be able to pick up on minimal left-conjunct situations, and to implement this we need something like the co-indexing mechanism we have proposed here. But once we have that mechanism, there is no argument from anaphora for incorporating situation-growing into the semantics. What if, in spite of its redundancy, we incorporated both minimal-situation coindexing *and* situation-growing? Besides being unmotivated, it’s not at all clear how this would help with presupposition projection. Suppose that we adopt a theory of conjunction along these lines. Compare ‘Sue used to smoke and she stopped smoking’ vs. ‘Sue used to live in Brazil and she stopped smoking’. Consider a situation of evaluation where Sue used to smoke, used to live in Brazil, and does not now smoke. Then both of these sentences will be simply true on the proposed semantics: they will have exactly the same status. But theories of presupposition projection are supposed to predict a difference between sentences like this: a key data point in these theories is that the first sentence does not presuppose that Sue used to smoke, while the second one does. This prediction does not fall out of a situation-growing conjunction. More generally, it’s hard to see how situation-growing, in this or other environments, would help account for presupposition projection or filtering.



these patterns coincide in a quite systematic way. This is something that calls out for explanation.

The third, and most serious, worry about the extended e-type approach we have sketched comes from the filtering of definiteness across sentences. The problem is simple: the mechanism of minimal situations under consideration depends on the indefinite and definite appearing under one operator. The idea is that that operator, on top of its normal job, quantifies over minimal situations which witness the first argument, and sets the designated situation variable for the second argument to those minimal situations. But now suppose that the indefinite and the definite appear in *different sentences*. Then there is no single operator which can do this job, i.e. pass on minimal situations from the indefinite to the definite.

To make this worry more concrete, think about a ‘want’-‘want’ sequence. As we have seen, indefinites filter uniqueness across environments like  $\lceil S \text{ wants } \varphi. S \text{ wants } \psi. \rceil$ , as in (27a), repeated here:

- (45) Mark wants to meet a man. He wants the man to be interesting.

What would it take to extend the minimal situation approach to a *sequence of sentences* like that in (45)? In other words, how could the present approach predict that (45) has no uniqueness presupposition? What we would want, if we are to extend the present strategy, would be something along the following lines, where  $Boul_{M,s}$  is the set of situations compatible with Mark’s wants in  $s$ :<sup>26</sup>

- (46)  $\llbracket (45) \rrbracket^{g,s} = 1$  iff  $\forall s' \in Boul_{M,s} : \llbracket \text{Mark meets a man} \rrbracket^{g,s'} = 1$  and for some minimal situation  $s'' \leq s'$  s.t.  $\llbracket \text{Mark meets a man} \rrbracket^{g,s''} = 1$ ,  $\llbracket [\text{the man}]_r \text{ is interesting} \rrbracket^{g_{[s'' \rightarrow r]}, s'} = 1$

This will filter uniqueness as desired. It is straightforward to get this meaning for a sentence with the form ‘Mark wants to meet a man and for him to be interesting’; indeed, that is what we get from the minimal-situation conjunction given above together with a simple quantificational semantics for ‘want’. But we see no way to get this meaning for the ‘want’-‘want’ sequence in (45) using the resources standardly available to e-type theories. The problem is that there is no operator in that sequence which takes scope over *both* the indefinite and the definite, and so no operator which can pass on minimal situations from the indefinite to the definite. What we will get instead for a sequence like (45) is a meaning like this:

- (47)  $\llbracket (45) \rrbracket^{g,s} = 1$  iff  $\forall s' \in Boul_{M,s} : \llbracket \text{Mark meets a man} \rrbracket^{g,s'} = 1$  and  $\forall s' \in Boul_{M,s} : \llbracket \text{The man is interesting} \rrbracket^{g,s'} = 1$

Could this, after all, be sufficient?<sup>27</sup> One thought here might be that, if Mark’s want-situations are small enough, then each will contain only one man; and perhaps the definite here can be indexed with a variable which somehow co-varies with the ‘want’-situations. Setting aside questions of how exactly this would be implemented, we can

<sup>26</sup> This assumes a simple quantificational semantics for ‘want’, but nothing turns on this assumption.

<sup>27</sup> Thanks to Simon Charlow for very helpful discussion here.

dispense with this response by considering again variants of sage-plant sentences in ‘want’-‘want’ sequences, as in (48):

- (48) Mark wants to meet a man. He wants to meet eight other men along with [him/the man].

The puzzle for this approach would be how to deal with the fact that the uniqueness of ‘him’/‘the man’ is filtered in (48) if we have truth conditions along the lines of those in (47). Then we would have the following:

- (49)  $\llbracket (48) \rrbracket^{g,s} = 1$  iff  $\forall s' \in \text{Boul}_{M,s} : \llbracket \text{Mark meets a man} \rrbracket^{g,s'} = 1$  and  $\forall s' \in \text{Boul}_{M,s} : \llbracket \text{Mark meets eight other men along with [him/the man]} \rrbracket^{g,s'} = 1$

If we try to do away with uniqueness by holding that Mark’s want-situations contain just one man each, as we might in the case of (45), then the second sentence in (48) could not be true. But clearly this whole sequence can be true and well-defined without ascribing any incoherence to Mark.

In sum: what we would need to extend the e-type strategy to ‘want’-‘want’ sequences would be co-indexation of ‘him’/‘the man’ with minimal meet-a-man situations from the prior sentence. But to achieve this using the standard resources of e-type theories, we would need one operator taking scope over both of these strings, in order to feed minimal situations to the definite for evaluating its presupposition. But such an operator is exactly what we don’t have here.

Similar points go for every other intersentential filtering environment: sequences of attitude reports, sequences of modals, and, most simply, unembedded intersentential anaphora. We will not go through these environments in detail, since the point is the same in each case. The present strategy relies on an operator to pass on minimal indefinite-witnessing situations to the definite. Yet in such sequences, no operator takes scope over both the indefinite and the definite, and so no operator is available to do what is required.

Let us consider briefly two ways that e-type theories might respond. The first suggestion comes from an anonymous referee for this journal. The idea is that, since e-type theories are anyways in the business of enriching sentences with unpronounced material, we could say that a sequence with the form ‘S wants  $\varphi$ . S wants  $\psi$ .’ can in fact be interpreted ‘S wants  $\varphi$ . S wants  ~~$\varphi$  and  $\psi$~~ .’, with the struck-through material unpronounced. (A mechanism along similar lines was proposed, for different reasons, in Rothschild (2017).) If we combine this interpretation with our situation-passing conjunction from above, this would account for the filtering behavior in these sequences. This is an interesting idea, but we think it unlikely to be correct. Let us make two points. The first is an abstract one. Enrichment mechanisms like NP-deletion (Elbourne’s solution to the formal link problem) are independently attested, and (thus) independently constrained. By contrast, the kind of enrichment mechanism under consideration here is (at present at least) totally unconstrained. Second, this kind of enrichment mechanism can only account for a limited portion of the relevant data. To see this, consider this variant on our ‘want’-‘want’ sequence:

(50) Mark wants to meet a man. Sue wants [him/the man] to be interesting.

Sequence (50) does not have a reading on which it is equivalent to (51):

(51) Mark wants to meet a man. Sue wants to meet a man and for [him/the man] to be interesting.

So the filtering of the uniqueness presupposition of [him/the man] in (50) cannot be due to an enrichment mechanism of the kind under consideration here (that uniqueness *is* filtered in sequences like (50) can be confirmed by the same tests used above). This means that an enrichment approach like this faces two challenges: (i) to explain why such enrichment is not available for sentences like (50); (ii) to find an alternate explanation of the filtering of uniqueness in (50). Even if the first challenge can be met, we suspect that any alternate explanation of sequences like (50) will also account for our original ‘want’-‘want’ sequences, making an enrichment mechanism like this otiose.

The second way we can imagine for e-type theories to get a meaning like the one in (46) for a sentence like (45) is by invoking some kind of mechanism that lets us pass information about indefinites between sentences: a mechanism that somehow records the indefinite in the first sentence and passes this record on for the definite to pick up in the second sentence. For instance, we could think about indefinites as being associated with a variable and recording their information in the context’s variable assignment—information that co-indexed definites could then pick up to satisfy their uniqueness presupposition. We think this is probably the correct way to deal with sequences like this in a broadly e-type framework. But any way of spelling this out will move us solidly towards the territory of dynamic semantics: this kind of sequential updating of variable assignments is, of course, one of the hallmarks of dynamic semantics. There might be a view to be developed here which still incorporates some features of e-type theories, and it is hard to pronounce on what exactly a theory like this would look like without its being developed in full. But it seems likely to us that any successful account of intersentential binding along the lines we have suggested will end up looking a lot more like standard dynamic semantics than standard e-type theories do.

The dialectic here is complicated, so let us summarize. We have argued that e-type theories do not naturally account for definiteness projection, and for definiteness *filtering* in particular, since, on e-type theories, indefinites entail only existence, not uniqueness. We have explored how e-type systems might be extended to account for definiteness filtering. Rather than treating this phenomenon as presupposition projection, e-type theories could try to generalize the minimal-situation apparatus they already use to account for definiteness filtering between restrictors/antecedents and scopes/consequents. This generalization seems possible for ‘and’ and ‘or’. However, the resulting system departs from classical treatments of the connectives, which is arguably one of the attractions of e-type systems, and it must posit two systems—presupposition projection, on the one hand, and minimal-situation-passing, on the other—to account for a phenomenon that looks unified. Most seriously, it cannot obviously account for intersentential filtering of uniqueness, and so does not look like it will be empirically adequate. When an indefinite filters uniqueness for a corresponding definite in another sentence, there is no operator in place that can pass on minimal

indefinite-witnessing situations to satisfy the definite's uniqueness presupposition. Instead, what we would need to implement such a system would be a mechanism that records the information carried in indefinites across sentences, and makes that information available to corresponding definites; in other words, we would need a system which updates variable assignments as discourse proceeds. That is, of course, exactly what dynamic semantics provides. So to satisfactorily implement an e-type theory, it looks like we would need a dynamic theory of variable updating in the background. A hybrid theory along these lines might have its own attractions; but once we have on hand the standard dynamic updating apparatus, the motivation for retaining other key pieces of the e-type framework becomes less clear. Further exploration of hybrid systems along these lines is clearly needed to evaluate these questions.

## 5 Dynamic semantics

Let us turn, finally, to consider the prospects of dynamic theories for accounting for definiteness projection. A central upshot of our discussion of definiteness projection is that the phenomenon is intimately connected to presupposition projection: in particular, indefinites appear to filter uniqueness implications of definiteness in the same environments where presuppositions are filtered in general. This is a connection that, again, e-type theories miss. By contrast, this connection is a central part of the Heimian dynamic approach to presuppositions and definiteness (Heim 1982, 1983b), which assimilates the processing of (in)definites and presupposition projection, as well as of presuppositional developments of Kamp's DRT system in van der Sandt (1989, 1992). We thus think that, from an abstract perspective, dynamic theories are better situated than e-type theories to account for definiteness projection.

However, they still fall short of accounting for the full pattern. Unlike for e-type theories, these shortcomings are known in the literature (though they have mostly been discussed piecemeal, rather than in relation to the generalization of definiteness projection). For this reason we will spend somewhat less time exploring these issues than we did for the corresponding issues for e-type theories; we should emphasize that this is not necessarily because they are less serious, but, again, because they are well known in the literature.

To repeat, definiteness projection has two faces: (i) the uniqueness inferences of definites are filtered by corresponding indefinites; but (ii) in the absence of such indefinites, definites generate uniqueness implications. As we saw, e-type systems have serious problems accounting for the first part of this generalization; dynamic systems face challenges accounting for both parts of the generalization.

We focus first on the first part of the generalization, definiteness filtering. While dynamic systems can naturally account for some of the links between presupposition projection and anaphora, they do not account for all the links that we highlight here. For example, dynamic accounts easily explain the lack of uniqueness implications when definite descriptions are used across sentences or under conjunctions: i.e. the cases we discussed in Sects. 3.1 and 3.3. Indeed, dynamic systems were designed exactly to cover these sorts of cases.

But dynamic systems struggle to extend this coverage to the other contexts we discuss, namely disjunctions (Sect. 3.4), attitude reports (Sect. 3.5), and modals (Sect. 3.6). These shortcomings have all been acknowledged and extensively discussed in the literature. The problem for disjunction is particularly well known in the form of the challenge to explain this famous example from Barbara Partee:

(52) Either this house doesn't have a bathroom or it's in a funny place.

To account for the presupposition projection behavior of disjunction generally, dynamic accounts need to adopt a special semantics for disjunction, such as Beaver's. But merely adopting this kind of semantics for disjunction does not itself account for the definiteness filtering of disjunction, for well-known technical reasons having to do with the invalidity of double negation elimination in dynamic systems. Krahmer and Muskens (1995) and Krahmer (1998) tackle this problem within a DRT framework, while Rothschild (2017) tackles it by reformulating aspects of dynamic semantics in a trivalent framework.

The problems dynamic semantics faces with respect to presuppositions and anaphora across attitude reports are also well known, and there are various attempts at expanding the dynamic framework to account for the data (Heim 1992; Cumming 2007; Sudo 2014; Maier 2015). Similarly, the challenges that dynamic semantics faces in explaining presupposition projection across modalized sentences are known in the literature (Roberts 1989). We will not explore these problems, or the solutions that have been proposed, in detail. In sum, dynamic semantics naturally captures some, but not all, of the connections between presupposition projection and uniqueness filtering. We will not try to pronounce on how good the prospects for principled extensions of dynamic semantics to cover these contexts are; but these shortcomings of dynamic semantics are, again, well known in the literature.

The second challenge for dynamic semantics is accounting for the second part of our generalization, uniqueness inferences: it is not clear how definites generate uniqueness implications in the first place in dynamic systems. In Heim's system (and similar developments since, e.g. Groenendijk and Stokhof 1991; Dekker 1994), definites are not associated with uniqueness presuppositions. Instead, they are associated with *familiarity* presuppositions: definites are appropriate only when they are co-indexed with an indefinite which has been introduced in the relevant context. This is a key part of how dynamic semantics accounts for definiteness filtering, to the extent that it does. But it is not obvious how a familiarity-based system would generate uniqueness inferences at all. To see the issue, consider the sequence in (53):

- (53) A: John went on a date.  
B: Well, if John liked the woman, he'll be happy he went out.

Here 'the woman' is felicitous, despite the lack of a preceding indefinite 'a woman'. To account for this, dynamic systems must countenance the possibility of *accommodating* a discourse referent: *making* the definite be familiar by quietly adding an appropriate discourse referent to the context. Now consider the same sentence in a plural context, as in (54):

- (54) A: John went on dates with a few different women.  
 # B: Well, if John liked the woman, he'll be happy he went out.

Why can't we simply accommodate a discourse referent for 'the woman' in (54), exactly as we do in (53)? Somehow the plural set-up seems to make this more difficult. Superficially it feels as if this should be easy to explain. But it's not clear to us how to do so. After all, if 'a date' in (53) lets us somehow accommodate a discourse referent for 'the woman'—open a new file for this definite, in Heim's metaphor—why doesn't 'dates with a few different women' do the same in (54)? Indeed, one might think in this case we could accommodate a few different discourse referents, and associate one arbitrarily with 'the woman'. At a high level the issue, again, is: how do we account for the apparent uniqueness implications of definites like 'the woman' in (54) in a dynamic system, where definites do not have uniqueness implications in the first place?

This problem has been recognized and discussed in the literature (Kadmon 1987, 1990; Szabó 2000; Roberts 2003).<sup>28</sup> The generalization that our present exploration points to is that dynamic theories undergenerate uniqueness implications in particular in cases of *accommodation*. When we encounter a definite ' $\iota F$ ' and no discourse referent has been explicitly introduced which satisfies the property  $F$ , we must be in a context in which there is at most one salient  $F$ -thing. In such a context, we can accommodate an  $F$ -discourse referent. By contrast, if there is more than one salient  $F$ -thing, we seem to be unable to accommodate a discourse referent for  $F$ : in plural contexts without a filtering indefinite, definites lead to infelicity.

One way to explain this pattern is to posit constraints on the process of accommodation. Indeed, Heim (1982, Ch. III, 5.2) notes that accommodation of a discourse referent may be more than a matter of making the minimal required adjustment to the context. Building on this idea, we might posit that, in order to accommodate a new discourse referent for 'the  $F$ ', we need to also accommodate the proposition that there is only one relevant  $F$ . This stipulation is perfectly coherent but calls out for explanation. One idea that might help explain this pattern is the suggestion of Szabó (2000) that speakers have a dislike of arbitrariness in resolving anaphora. We could spell this out as follows. The background assumptions would be standard Heimian dynamic ones. Then we would add the assumption that speakers are able to accommodate discourse referents, but not arbitrarily. In other words, accommodation of a discourse referent for ' $\iota F$ ' can only work when there is at most one salient  $F$ -thing. So, when there is at most one salient man, speakers can accommodate a discourse referent for 'the man'; by contrast, when there is more than one salient man, they will not be able to do so, because this would require arbitrarily associating the definite with some one of the salient men. When there is a filtering indefinite, however, no accommodation at all will be required, and so these considerations will not come into

<sup>28</sup> Roberts (2003) argues that definites presuppose there is a unique discourse referent. However, as she recognizes, merely positing that 'the  $F$ ' presupposes there is only one *discourse referent* that is an  $F$  doesn't itself explain why we get the implication that there is only one  $F$  in the contextually relevant domain; Roberts tries to use quantity-based implicatures to fill the gap. Szabó (2000), by contrast, tries to account for uniqueness implications by appeal to non-arbitrariness constraints. It is not clear to us that either of these accounts delivers exactly the present generalization—namely, that uniqueness implications arise only in cases of accommodation—though as is clear we are sympathetic with core parts of Szabó's account.

play. This is an overall picture which strikes us as being motivated by the evidence we have surveyed here. It is certainly a coherent picture. So dynamic semantics, in our view, can likely be augmented in order to account for the generation of uniqueness implications in cases of accommodation. But more work would be needed to explain the underlying assumptions here. After all, when we encounter a definite with no corresponding discourse referent but many salient individuals who satisfy the definite's descriptive content, why *not* simply create a discourse referent, arbitrarily associating it with one of the salient entities, in order to make for a coherent sequence?

In sum, then, Heimian dynamic semantics strikes us as somewhat better situated than e-type theories to account for definiteness projection, insofar as the system is set up from the start to assimilate presupposition projection and the licensing of definites. However, dynamic semantics still faces (well-known) shortcomings in accounting for both parts of our generalization.

## 6 Conclusion

Our main goal here has been to bring out the empirical contours of definiteness projection: definite descriptions and pronouns give rise to uniqueness implications, but these implications can be filtered by preceding indefinites in the same way that presuppositions are generally filtered. We have argued that the e-type approach faces fundamental problems in accounting for this pattern. E-type theories have developed strategies to account for some definiteness filtering in quantified sentences and conditionals. But to account for definiteness filtering in general, these strategies would need to be extended across the board. It is not at all clear that this can be done in a satisfying way; in particular, doing so in intersentential cases looks as if it would require something like dynamic variable updating. Dynamic semantics, which treats definiteness and presupposition as akin from the start, is from an abstract point of view in a somewhat better situation; nonetheless, extant versions of dynamic semantics struggle to account for the full pattern of definiteness projection. Our central goal, however, has not been to argue conclusively against any theory, but rather to bring out in detail one central desideratum for any adequate theory of donkey anaphora: namely, accounting for definiteness projection.

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